

Global Anoxia and late Permian Source Rocks – New Frontiers in a Frontier Basin, Sverdrup Basin, Canadian High Arctic

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Summary

The Sverdrup Basin hosts some of the largest gas reserves in Canada despite having received only limited drilling. Previous exploration and resource assessment efforts in the Sverdrup Basin have focused on Triassic and Jurassic reservoirs based on the assumption that the Triassic Schei Point Group was the source rock. Reassessment of thermal maturity data indicates that in the western and northernmost Sverdrup Basin, Mesozoic source rocks have lower thermal maturity than previously thought and did not pass the oil window. This suggests that some of the gas fields were filled from deeper source rocks. Deeper source rocks would open new untested play concepts in the basin.

Here we report discovery of late Permian organic rich shales on the northern margin of the Sverdrup Basin. These units have TOC values up to 7% and have thermal maturity values within the oil window. Given the lack of surface exposure and subsurface data for much of the basin it is difficult to constrain how extensive these organic rich units are. The organic rich sequence described here was deposited during a latest Permian anoxia event, consistent with observation of global anoxia associated with the Permian/Triassic extinction. This suggests that organic deposition was likely a basin wide event and should be extensive. This opens the possibility of entirely new deeper play concepts for much of the Sverdrup Basin that have not yet been tested.